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A week later their arboreal home had so far progressed that they could enter and be screened from the view of their vexatious little enemies. Here they worked and delved — if I may be allowed the term — for another week to secure the proper depth. The ground for several yards around the tree was strewn with the tiny, white chips brought up at intervals and cast to the winds with that peculiar flirt of the head and bill which is characteristic of this avian family. About the middle of July, I found both parents busily occupied in searching the trunks and limbs of trees for larvæ and worms to feed their young. During and after the period of incubation, the familiar notes of this bird were rarely heard except very early in the morning. The first week in August both families of woodpeckers disappeared and have not been seen since.

## RECENT LITERATURE.

Cope's Vertebrate Palæontology of New Mexico.[1] — The present volume of nearly four hundred pages of text and upward of sixty plates comprises Professor Cope's final report upon the vertebrate palæontology of New Mexico to the Wheeler survey. The species here described and figured have in greater part been previously characterized in various preliminary papers published by Professor Cope during the last three years; they are here treated more in detail, with the addition of nearly one thousand excellent figures. The volume hence takes rank as one of the most important contributions to North American vertebrate palæontology that has yet appeared. Among the results attained are, as announced by the author, "the elucidation of the structure of the western slope of the Rocky Mountains and the plateau to the westward of them, in Northwestern New Mexico;" "the determination of the fresh-water character of the 'Triassic' beds in that region;" "the discovery of extensive deposits of the Lower Eocene, equivalent to the Suessonian of Western Europe;" "the determination of the faunæ of four periods, in basins which had not previously been explored, namely, in the Trias, the Eocene, the Loup Fork Epoch, and the Postpliocene of the Sandia Mountains." The number of species of extinct vertebrata "obtained during the season of 1874," and described in the present report, are "? Triassic, 4; Cretaceous, 13; Eocene, 87; Upper Miocene (Loup Fork), 30; Postpliocene, 2;" making a total of 136 species. The greater part of the remains on which this report is based were collected by the author himself, who thus had the opportunity of becoming familiar with their stratigraphical relations.

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[1] *Report upon United States Geographical Surveys West of the One Hundredth Meridian.* In charge of First Lieut. Geo. M. Wheeler, Corps of Engineers U. S Army. Vol. IV. Palæontology, Part II. *Report upon the Extinct Vertebrata obtained in New Mexico by Parties of the Expedition of* 1874. By Prof. E. D. Cope. 4to, pp. xii., 370; pls. xxii.–lxxxiii. Washington. 1877.

In discussing the character of the great Eocene plateau of New Mexico, first explored by Professor Cope in 1874, it is claimed that the Tertiary mammalian fauna originated through a migration from the southward, replacing the Mesozoic type of Saurians which had until then occupied the field. "New Mexico," he concludes, "was then no doubt the source from which the fauna of Wyoming was derived, and the extension of the Wahsatch [or Green River] fauna probably proved fatal to the latest representatives on the American continent of the dinosaurian and other reptilian forms of Mesozoic time."

The work before us is divided into three chapters: the first is devoted to the Fossils of the Mesozoic Periods and the Geology of the Mesozoic and Tertiary Beds; the second to the Fossils of the Eocene Period; and the third to the Fossils of the Loup Fork Epoch. The Mesozoic vertebrata described embrace a single species of fish allied to the *Mugillidæ*, a large crocodilian, and a large, "probably terrestrial" animal, "with powerful fore and hind limbs subequally developed," called *Dystrophæus viæmalæ*, of doubtful class affinities. The Eocene types include several forms known also from the Cretaceous and Tertiary, and the Lepidostoid genus *Clastes*, known thus far only from the Eocene of the Rocky Mountains. The reptiles are more numerously represented, and embrace turtles, crocodilians, and ophidians. Of the six genera of turtles three (*Trionyx*, *Dermatemys*, and *Emys*) still exist. The several species of crocodiles are referred (some of them doubtfully) to the existing genus *Crocodilus*. The only bird described (*Diatryma gigantea*) was of large size, the single tarso-metatarsal bone, by which it is thus far known, having a breadth at its proximal end "nearly twice the diameter of that of the ostrich. Its discovery introduces this group of birds to the known faunæ of North America, recent and extinct, and demonstrates that this continent has not been destitute of the gigantic forms of birds now confined to the southern hemisphere faunæ." It is considered as allied to *Gastornis* Hèbert of the Eocene of France. The mammalia of this period are numerous, amounting to fifty-four species. Of these, ten are referred to the order *Perissodactyla*, eight to the order "*Amblypoda*," thirty to his new order "*Bunotheria*," and three to the order *Rodentia*. Space will not permit of more than a brief notice of these groups, the affinities and characteristics of which, and their various subdivisions, are discussed in detail. The *Bunotheria* were abundantly represented during the North American Eocene, during which period they "fulfilled the functions of the existing *Carnivora*." While they agree quite nearly in structure among themselves, they differ in important particulars from the true *Carnivora*. They are described as varying from the size of a weasel to that of a jaguar. Some of the puzzling forms here brought together were at first referred to the *Carnivora*, others to the lemurine *Quadrumana*, others to the *Insectivora;* others still have been supposed to have ungulate affinities, and others constitute Professor Marsh's order *Tillodontia.* Professor Cope considers that his order *Bunotheria* cannot be defined so as to separate from it the existing Insectivora. Under this ordinal name he hence includes the existing *Insectivora* as a suborder, and considers that further investigations will be necessary to determine the relations of the *Prosimiæ* to this order. The *Bunotheria* are divided into five suborders: *Creodonta*, *Mesodonta*, *Insectivora*, *Tillodonta*, and *Tæniodonta*, which subdivisions are regarded as not more heterogeneous than those of the *Marsupalia.* The affinities of the *Bunotheria* are very divergent. While the *Insectivora* maintain their typical characters, the Tillodonts show a certain kind of affinity with the Rodents, and the Tæniodonts present "a point of connection with the Edentates," — the first hint of relationship between this anomalous order and the other mammals. The Mesodonts are apparently related to the Prosimiæ and Quadrumanes, as are the Creodonts to the Carnivores. If these interpretations prove to be correct, we have in the Bunotherians an extensive early generalized group foreshadowing the later more specialized mammalian orders of the present day. To this group are referred many of the mammalian genera of the early Eocene of Europe, as well as the Wahsatch and Bridger faunæ of the early Eocene of North America.

The order *Amblypoda* is regarded as the most generalized order of hoofed mammals, "being intermediate in the structure of their limbs and feet between the *Proboscidia*, the *Perissodactyla*, and the *Artiodactyla*," which fact, "together with the small size of the brain, places them in antecedent relation to the latter, in a systematic sense, connecting them with the lower mammals with small and smooth brains, still in existence; and in a phylogenetic sense, since they precede the other orders in time, they stand in the relation of ancestors. It is doubtless true that the *Amblypoda* were the ancestors of all living ungulates, although no genus of the latter can yet be traced to any known genus of the former, such genera remaining for future discovery." The proportional size of the brain, as shown by Professor Marsh, in respect to the *Dinocerata* (referred by Cope to the *Amblypoda*) is more like that of reptiles than of mammals, and another reptilian feature is seen in the immovable tibiotarsal articulation, — hints merely of a very remote reptilian relationship. Two suborders of this group are recognized, *Pantodonta* and *Dinocerata.* To this order is referred the genus *Coryphodon* Owen (*Bathmodon* Cope), several species of which are here described in detail, together with an account of the milk dentition.

The *Perissodactyla* are represented in the Wahsatch Eocene by comparatively few species, all of small size, but some of them were numerously represented in individuals. They belong chiefly to the genera

*Orotherium* Marsh, and *Hyracotherium* Owen (to which latter Cope refers *Orohippus* Marsh). *Hyracotherium* has several near allies, both in the Old World and the New, and is here treated not only as a Perissodactyl, but is considered as having ancestral relations to the Equine series.

Passing over the interesting Review of the Characteristics of the Vertebrate Fauna of the Wahsatch Eocene of New Mexico (pp. 269–282), we have space for only a very brief notice of the chapter devoted to the fossils of the "Loup Fork Epoch." Among these are described two species of tortoise (*Testudo*), and one bird referred to the genus *Vultur*. Of the mammalia three are Rodents, three Carnivora (one referred to *Putorius* and two to *Canis*, one of the latter, *C. ursinus*, as large as the black bear), one Proboscidian (*Mastodon productus*), four Perissodactyls, and eleven Artiodactyls. The latter belong chiefly to the cameline group (genera *Merychyus* Leidy, *Procamelus* Leidy, and *Phliauchenia* Cope) and partly to the peculiar deer-antelope type here referred to *Dicrocerus* Lartet (*Merycodus* and *Corsoryx* Leidy), a probable progenitor of the deer tribe (*Cervidæ*).

The Loup Fork beds have been commonly viewed as representative of the Pliocene of France, although their exact synchronism has been considered as doubtful. Professor Cope believes that the general facies of the Loup Fork fauna indicate an earlier age than this, and that the Pliocene of America remains yet to be defined. The Loup Fork fauna is characterized by an absence of fishes and crocodiles, from which it is inferred that the "formation is that of a marsh and not of a lake." The fauna has been studied at three widely separated localities in the region west of the Mississippi River, between the strata of which there is a near lithological resemblance, and the fauna collectively presents a common character as distinguished from that which preceded and followed. It is hence isolated alike from the Quaternary and the White River epochs. Only three of the genera have living representatives, one of which (*Canis*) also occurs in the White River beds.

In conclusion may be noted the growing tendency to a recognition of the generic identity of a considerable proportion of the Tertiary genera of North America with their European representatives of approximately corresponding age.

THE WILD FLOWERS OF AMERICA, PART II.[1] — The second part of the present work includes plates of *Iris versicolor* L., the common blue flag; *Rudbeckia columnaris* Pursh, the columnar cone-flower; *Viola sagittata* Aiton, the arrow-leaved violet, accompanied by a figure of *Carex Pennsylvanica* Lam.; and *Steironema lanceolatum* Gray, the lance-leaved loosestrife. The latter plant is more familiar to our botanists under the older name of *Lysimachia lanceolata*. The four plates are beautifully

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[1] *The Wild Flowers of America.* Part II. Illustrations by ISAAC SPRAGUE. Text by GEORGE L. GOODALE, M. D., Assistant Professor of Vegetable Physiology, and Instructor in Botany, in Harvard University. Boston: H. O. Houghton & Co.; New York: Hurd & Houghton.